



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/792,244	03/03/2004	David R. Hembree	3592.10US (97-0321.10/US)	3976
24247	7590	12/29/2005	EXAMINER MITCHELL, JAMES M	
TRASK BRITT P.O. BOX 2550 SALT LAKE CITY, UT 84110			ART UNIT 2813	PAPER NUMBER

DATE MAILED: 12/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	Application No. 10/792,244	Applicant(s) HEMBREE, DAVID R.	
	Examiner James M. Mitchell	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>11/2/2005</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This office action is in response to the amendment filed October 5, 2005.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3, 4, 6, 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Desai et al. (U.S. 6,166,434) in combination with Block et al. (U.S. 5,137,959).

Desai (Fig 2A-F) discloses a semiconductor assembly comprising: a substrate (206) having a plurality of circuits (i.e. in contact with balls) on a portion of a surface thereof; a semiconductor die (203) having a plurality of bond pads located on an active surface thereof (i.e. portion in contact with balls) and having a back side surface; a plurality of solder balls (204) connecting at least a portion of the plurality of bond pads of the semiconductor die to at least a portion of the plurality of circuits of the substrate; one of a glob top material and low viscosity polymeric (208; Col. 6, Lines 60-63) filling any space between the substrate and the semiconductor die; an thermal conductive adhesive (not shown; Col. 6, Lines 40-45) contacting at least a portion of the back side surface of the semiconductor die; and a heat sink cap (210; Col. 5, Lines 48-55) having portion thereof contacting a portion of the substrate covering the interface, the semiconductor die, the plurality of solder balls, and a portion of the substrate, the heat

sink cap having the edge portion (e.g., bottom of cap) substantially contacting the substrate ((Col. 6, Lines 47-51) and the heat sink contacting at least a portion the interface.

Desai does not appear to show that its thermal adhesive is a compliant, adhesive, gel elastomer, cross linked silicone, filled with thermally conductive material.

Block utilizes an interface that is a compliant, adhesive, gel elastomer, cross linked silicone, filled with thermally conductive material (Col. 1, Lines 55-65).

It would have been obvious to one of ordinary skill at the time the invention was made to form the adhesive of Desai with a compliant, adhesive, gel elastomer, cross linked silicone, filled with thermally conductive material in order to improve thermal conductivity as taught by Block (Col. 1, Lines 41-45)

Claims 2, 5, 7, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Desai (U.S 6,166,434) and Block et al. (U.S. 5,137,959) as applied to claims 1, 4, 6 and 9 and further in combination with Chia et al. (U.S. 6,225,695).

Neither Desai nor Block appears to shoe the heat-dissipating member with fins.

Chia teaches the use of fins (Fig 1A).

It would have been obvious to one of ordinary skill in the art to incorporate fins on the heat-dissipating member of Desai in order to order to provide greater surface area for cooling as taught by Chia (Col. 2, Lines 53-55).

Response to Arguments

Applicant's arguments with respect to the amended claims have been considered but are moot in view of the new ground(s) of rejection.

In order to expedite prosecution, examiner has addressed limitations that may be relevant. Applicant contends that the prior art's cap does not touch the substrate and cites to a portion of the prior art's specification that indicates there is a gap for the underfill *in the process of placing the cap on the chip*; it does not preclude no portion of the cap is contact with the substrate. Examiner is unpersuaded, because the prior art explicitly discloses that a portion of its cap (214, 216) is in contact with its substrate as indicated in the office action.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art discloses generally a heat dissipating member in contact with both the back surface of the chip through a thermal interface and a portion of the member in contact with the substrate.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (571) 272-1931. The examiner can normally be reached on M-F 8:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.


Art Unit: 2813

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jmm

December 16, 2005



CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800